

## PATENT COOPERATION TREATY

PCT

## NOTIFICATION OF ELECTION

(PCT Rule 61.2)

From the INTERNATIONAL BUREAU

To:

Assistant Commissioner for Patents  
United States Patent and Trademark  
Office  
Box PCT  
Washington, D.C.20231  
ETATS-UNIS D'AMERIQUE

in its capacity as elected Office

Date of mailing (day/month/year)

14 June 2000 (14.06.00)

International application No.

PCT/US99/19106

Applicant's or agent's file reference

8399-007-228

International filing date (day/month/year)

20 August 1999 (20.08.99)

Priority date (day/month/year)

21 August 1998 (21.08.98)

Applicant

KUMAR, Guneet et al

1. The designated Office is hereby notified of its election made:



in the demand filed with the International Preliminary Examining Authority on:

20 March 2000 (20.03.00)



in a notice effecting later election filed with the International Bureau on:

2. The election ☒ was

was not

made before the expiration of 19 months from the priority date or, where Rule 32 applies, within the time limit under Rule 32.2(b).

The International Bureau of WIPO  
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Facsimile No.: (41-22) 740.14.35

Authorized officer

F. Baechler

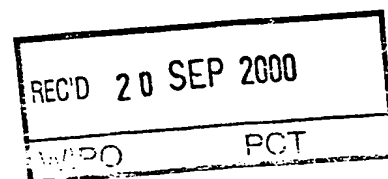
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## PATENT COOPERATION TREATY

## PCT

## INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)



|   |   |  |
|---|---|--|
| Applicant's or agent's file reference<br>8399-007-228   | <b>FOR FURTHER ACTION</b> See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416) |  |
| International application No.<br>PCT/US99/19106   | International filing date (day/month/year)<br>20 AUGUST 1999  | Priority date (day/month/year)<br>21 AUGUST 1998 |
| International Patent Classification (IPC) or national classification and IPC<br>IPC(7): C08B 37/08; C12P 19/26 and US Cl.: 536/20; 435/84 |   |  |
| Applicant<br>KUMAR, GUNEET  |   |  |

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.
2. This REPORT consists of a total of 3 sheets.
- ☐ This report is also accompanied by ANNEXES, i.e., sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority. (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).
- These annexes consist of a total of 0 sheets.

## 3. This report contains indications relating to the following items:

- I ☒ Basis of the report
- II ☐ Priority
- III ☐ Non-establishment of report with regard to novelty, inventive step or industrial applicability
- IV ☐ Lack of unity of invention
- V ☒ Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- VI ☐ Certain documents cited
- VII ☐ Certain defects in the international application
- VIII ☐ Certain observations on the international application

|  |   |
|--|---|
| Date of submission of the demand<br>20 MARCH 2000  | Date of completion of this report<br>25 AUGUST 2000                         |
| Name and mailing address of the IPEA/US<br>Commissioner of Patents and Trademarks<br>Box PCT<br>Washington, D.C. 20231<br>Facsimile No. (703) 305-3230 | Authorized officer<br>KATHLEEN KAHLER FONDA<br>Telephone No. (703) 308-1235 |

## INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No.

PCT/US99/19106

## I. Basis of the report

## 1. With regard to the elements of the international application:\*

☒ the international application as originally filed☒ the description:

pages 1-33, as originally filed  
pages NONE, filed with the demand  
pages NONE, filed with the letter of

☒ the claims:

pages 34-38, as originally filed  
pages NONE, as amended (together with any statement) under Article 19  
pages NONE, filed with the demand  
pages NONE, filed with the letter of

☒ the drawings:

pages 1-6, as originally filed  
pages NONE, filed with the demand  
pages NONE, filed with the letter of

☒ the sequence listing part of the description:

pages NONE, as originally filed  
pages NONE, filed with the demand  
pages NONE, filed with the letter of

2. With regard to the language, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.  
These elements were available or furnished to this Authority in the following language \_\_\_\_\_ which is:

- ☐ the language of a translation furnished for the purposes of international search (under Rule 23.1(b)).  
☐ the language of publication of the international application (under Rule 48.3(b)).  
☐ the language of the translation furnished for the purposes of international preliminary examination (under Rules 55.2 and/or 55.3).

## 3. With regard to any nucleotide and/or amino acid sequence disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

- ☐ contained in the international application in printed form.  
☐ filed together with the international application in computer readable form.  
☐ furnished subsequently to this Authority in written form.  
☐ furnished subsequently to this Authority in computer readable form.  
☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.  
☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. ☒ The amendments have resulted in the cancellation of:

- ☒ the description, pages NONE  
☒ the claims, Nos. NONE  
☒ the drawings, sheets/fig NONE

5. ☐ This report has been drawn as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).\*\*

\* Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17).

\*\*Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.

## INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No.

PCT/US99/19106

**V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement****1. statement**

|                               |                         |     |
|-------------------------------|-------------------------|-----|
| Novelty (N)                   | Claims <u>1-32</u>      | YES |
|                               | Claims <u>33 and 34</u> | NO  |
| Inventive Step (IS)           | Claims <u>1-32</u>      | YES |
|                               | Claims <u>33 and 34</u> | NO  |
| Industrial Applicability (IA) | Claims <u>1-34</u>      | YES |
|                               | Claims <u>NONE</u>      | NO  |

**2. citations and explanations (Rule 70.7)**

Claim 33 lacks novelty under PCT Article 33(2) as being anticipated by HASHIMOTO *et al.* At column 2, lines 40-48, the reference teaches a modified chitosan polymer which is soluble in both acidic and basic aqueous solution. Thus, claim 33 is anticipated.

Claim 34 lacks novelty under PCT Article 33(2) as being anticipated by COLE. At column 14, lines 20-24, the reference teaches a modified chitosan polymer having a viscosity of 2000 cps (2000 centipoise, or 20 poise). Thus, claim 34 is anticipated.

Claims 1-32 meet the criteria set out in PCT Article 33(2)-(3), because the prior art does not teach or fairly suggest the claimed methods of making a modified chitosan polymer, or the claimed modified chitosan polymers made by the methods.

Claims 1-34 meet the criteria set out in PCT Article 33(4), because the claimed methods of making a modified chitosan polymer, and the claimed modified chitosan polymers made by the methods, are industrially useful, for example in the waste water treatment industry.

----- NEW CITATIONS -----

NONE



## INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

|  |           |   |
|--|-----------|---|
| <b>(51) International Patent Classification <sup>7</sup> :</b><br><b>C08B 37/08, C12P 19/26</b>  | <b>A1</b> | <b>(11) International Publication Number:</b> <b>WO 00/11038</b><br><b>(43) International Publication Date:</b> 2 March 2000 (02.03.00)   |
| <b>(21) International Application Number:</b> PCT/US99/19106<br><b>(22) International Filing Date:</b> 20 August 1999 (20.08.99)<br><b>(30) Priority Data:</b><br>60/097,709 21 August 1998 (21.08.98) US<br><b>(71)(72) Applicants and Inventors:</b> KUMAR, Guneet [IN/US];<br>10218 Ferea Farm Court, Ellicott City, MD 21042 (US).<br>PAYNE, Gregory, F. [US/US]; 1803 Miller Road, Hunt<br>Valley, MD 21030 (US).<br><b>(74) Agents:</b> CORUZZI, Laura, A. et al.; Pennie & Edmonds LLP,<br>1155 Avenue of the Americas, New York, NY 10036 (US).                  |           | <b>(81) Designated States:</b> AE, AL, AM, AT, AU, AZ, BA, BB, BG,<br>BR, BY, CA, CH, CN, CU, CZ, DE, DK, EE, ES, FI, GB,<br>GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG,<br>KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK,<br>MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI,<br>SK, SL, TJ, TM, TR, TT, UA, UG, US, UZ, VN, YU, ZA,<br>ZW, ARIPO patent (GH, GM, KE, LS, MW, SD, SL, SZ,<br>UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD,<br>RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK,<br>ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI<br>patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR,<br>NE, SN, TD, TG).<br><br><b>Published</b><br><i>With international search report.</i><br><i>Before the expiration of the time limit for amending the<br/>claims and to be republished in the event of the receipt of<br/>amendments.</i> |
| <b>(54) Title:</b> MODIFIED CHITOSAN POLYMERS AND ENZYMATIC METHODS FOR THE PRODUCTION THEREOF   |           |   |
| <b>(57) Abstract</b><br><br>The present invention is directed to homogeneous phase enzyme-catalyzed processes for producing modified chitosan polymers or oligomers. An enzyme is reacted with a phenolic substrate in the presence of a chitosan polymer or oligomer to produce a modified chitosan polymer or oligomer. The invention also includes modified chitosan polymers or oligomers produced by the novel processes, in particular modified chitosan polymers or oligomers having useful functional properties, such as base solubility and/or high viscosity. |           |   |

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| EE | Estonia                  | LR | Liberia                                  | SG | Singapore                                    |    |                          |

## INTERNATIONAL SEARCH REPORT

International application No.  
PCT/US99/19106

## A. CLASSIFICATION OF SUBJECT MATTER

IPC(7) : C08B 37/08; C12P 19/26

US CL : 536/20; 435/84

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

U.S. : 536/20; 435/84

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched  
none

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

databases: WEST 1.2, HCAPLUS

search terms: chitosan, viscosity, poise, base, basic, alkali, alkaline, tyrosinase, tyrosine oxidase, phenol

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

| Category* | Citation of document, with indication, where appropriate, of the relevant passages  | Relevant to claim No. |
|-----------|---|-----------------------|
| X         | US 5,474,989 A (HASHIMOTO et al.) 12 December 1995, see column 2, lines 40-48.  | 33                    |
| X         | US 5,147,698 A (COLE) 15 September 1992, see column 14, lines 20-24.  | 34                    |
| A         | SUN et al. Tyrosinase-Containing Chitosan Gels: A Combined Catalyst and Sorbent for Selective Phenol Removal. Biotechnology and Bioengineering. 05 July 1996, Volume 51, pages 79-86. | 1-34                  |
| A         | TATSUMI, K. et al. Removal of Phenols from Wastewater by an Enzyme and Chitosan. Advances in Chitin Sciences. 1997, Volume 2, pages 864-869.  | 1-34                  |

☐ Further documents are listed in the continuation of Box C. ☐ See patent family annex.

|   |  |
|---|--|
| * Special categories of cited documents:  | *T* later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention  |
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Date of the actual completion of the international search

15-DECEMBER 1999

Date of mailing of the international search report

10 JAN 2000

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